09-19-00 A

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	P00,1757
First Named Inventor or Application Identifier	
Dr. Michael Greiner et al,	
Express Mail Label No: #EJ220501797US	

jc490 U.S. PTO 09/664465 09/18/00

ADDRESS TO: **Assistant Commissioner for Patents**
Box Patent Application
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jc930 U.S. PTO 09/18/00

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. X Specification [Total Pages 16]
2. X Drawing(s) (35USC 113) [Total Pages 2]
3. X Declaration and Power of Attorney [Total Pages 2]
   a. __ Executed declaration (Original copy)
   b. __ Copy from prior application (37CFR 1.63(d)) *(for continuation/divisional with Box 14 completed)*
      [Note Box 4 Below]
      i. __ DELETION OF INVENTOR(S) Signed statement attached deleting Inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
4. __ Incorporation By Reference (usable if Box 3b is checked) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 3b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

ACCOMPANYING APPLICATION PARTS

5. __ Assignment Papers (cover sheet & documentation)
6. X Letter under 37 CFR 1.41(c).
7. __ English Translation Document *(if applicable)*
8. __ Information Disclosure Statement (IDS)/PTO-1449 __ Copies of IDS Citations
9. __ Preliminary Amendment
10. X Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
11. __ Small Entity Statement(s) __ Statement filed in prior application, Status still proper and desired
12. __ Certified Copy of Priority Document(s) German Application No. 199 45 021.8-34 filed September 20, 1999
13. __ Other:

14. If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information:*

__ Continuation __ Divisional __ Continuation-in-part (CIP) __ of prior application No: /

CLAIMS AS FILED

(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) BASIC FEE
				$690.00
TOTAL CLAIMS 20	30	10	$18.00	$180 00
INDEPENDENT CLAIMS 3	4	1	$78.00	$78.00
	ANY MULTIPLE DEPENDENT CLAIMS? ()YES (X) NO			
			TOTAL FILING FEE ->	$948.00

X The Commissioner is hereby authorized to charge any additional fees which may be required in connection with this application, or credit any overpayment to ACCOUNT NO. 501-519. A duplicate copy of this sheet is enclosed.

X A check in the amount of $ 948.00 to cover the filing fee is enclosed.

15. CORRESPONDENCE ADDRESS

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SIGNATURE: Steven P Hobart #24,149 **DATE:** September 18, 2000

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U-11

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September 18, 2000

Assistant. Commissioner for Patents
Washington, D. C. 20231

RE: Proposed Patent Application for Michael Greiner et al Entitled "A METHOD OF CONTROLLING A COOKING PROCESS AND A COOKING PROCESS SENSOR FOR USE WITH THE METHOD" - Our Case No. P00,1757

SIR:

Under the provisions of 37 CFR 1.41(c), I am filing the attached application comprising pages 1-16 with 301 claims, unexecuted Declaration, 2 sheets of formal drawings comprising FIGS. 1-2, and filing fee, on behalf of Michael Greiner and request that the application be assigned a serial number and filing date pursuant to the provisions of 37 CFR 1.53(b) and 37 CFR 1.53(d).

Respectfully submitted,

Brett A. Valiquet (Reg. #27,841)
Attorney for Applicant

BV/cb
Encls.

SPECIFICATION

TITLE

"A METHOD OF CONTROLLING A COOKING PROCESS AND A COOKING PROCESS SENSOR FOR USE WITH THE METHOD"

BACKGROUND OF THE INVENTION

The instant invention relates to a method of controlling a cooking process in response to at least two temperature values picked up by a cooking process sensor which is adapted to be stuck at least partly into food to be cooked. The instant invention also relates to a cooking process sensor to be used with a method specified.

A method of the generic kind defined above is known, for instance, from DE 31 19 496 Al. With this known method, a food thermometer is used which comprises a lance-like sensor portion, useful for temperature control, and being equipped with a plurality of temperature sensors and adapted to be stuck into food to be cooked. The known food thermometer is electrically connected to an evaluating unit so that the output of a microwave source is reduced gradually via process control when a certain temperature threshold value, preferably a maximum value per temperature sensor, is reached. It is a disadvantage of the known method that its range of application is very limited in view of the fact that merely threshold temperature values are relied upon for stepwise controlling of the cooking process.

SUMMARY OF THE INVENTION

It is an object of the instant invention to improve the method defined initially such that the disadvantages of the prior art are overcome.

The object is met, in accordance with the invention, in that specific parameters of cooking food and/or cooking utensils are determined via the thermokinetics of the

temperature values registered, and the specific cooking food and/or cooking utensil parameters determined are utilized for controlling the cooking process.

In accordance with the invention provision may be made for having the cooking process sensor detect a plurality of temperature values, preferably four, at various depths of penetration inside the cooking food and at least one more temperature value outside of the cooking food, preferably at the surface of the cooking food, and for using these values to control the cooking process.

Furthermore, it is suggested according to the invention to register at least one moisture value in and/or at the cooking food by means of the cooking process sensor and draw upon it for controlling the cooking process.

It is likewise proposed according to the invention that the flow of air at least at the cooking food be registered by the cooking process sensor and relied upon for controlling the cooking process.

According to the invention, moreover, it is proposed that differential temperature values and/or differential moisture values between sensors arranged spaced apart along the direction of penetration of the cooking process sensor be detected and drawn upon for controlling the cooking process.

A further development of the invention is characterized in that the core temperature of the cooking food, the placement of the cooking process sensor in the cooking food, especially with respect to the core point of the cooking food, the diameter of the cooking food, the density of the cooking food, the type of cooking food, the degree of ripeness of the cooking food, the pH of the cooking food, the consistency of the cooking food, the storage condition of the cooking food, the smell of the cooking food, the taste of the cooking food, the quality of the cooking food, the browning of the

cooking food, the crust forming of the cooking food, the vitamin decomposition of the cooking food, the formation of carcinogenic substances in the cooking food, the hygiene of the cooking food, and/or the heat conductivity of the cooking food is/are determined as a specific cooking food parameter or parameters, preferably by extrapolation or iteration of the values registered by the cooking process sensor.

According to the invention it is also proposed to determine as cooking utensil parameter or parameters the power, the amount of air circulated, the energy consumption, the charge, the specific performance and/or the load:power ratio of a cooking utensil, preferably by extrapolation or iteration of the values registered by the cooking process sensor.

An embodiment of the invention is characterized in that the temperature values, the differential temperature values, the moisture values, the differential moisture values and/or the air flow values registered are supplied by the cooking process sensor to a control unit for a heater element, a cooling element, a ventilator, a unit for introducing moisture into the cooking space, a unit for discharging moisture from the cooking space, a unit for supplying energy, and/or a unit for dissipating energy, especially for controlling the course of the cooking process and/or achieving a set cooking result.

It is further proposed in accordance with the invention that the temperature values, the differential temperature values, the moisture values, the differential moisture values, and/or the air flow values registered by the cooking process sensor be utilized for controlling the temperature path, the moisture content, the air flow, the defined parameters of the cooking food and/or cooking utensils.

It may also be provided according to the invention that the water activity, the moisture content, and/or the protein content of the cooking food is/are determined by the cooking process sensor or supplied to an evaluating unit for the parameters obtained by the cooking process sensor.

Moreover, the invention provides a cooking process sensor for use with a method according to the invention, comprising a tip equipped with at least two sensors and to be introduced at least partly into cooking food, preferably by means of a handle.

It may be provided for the tip to comprise at least four temperature sensors and at least one temperature sensor to be provided at the handle.

A preferred further development of the invention is characterized by comprising at least one other sensor unit adapted to be fixed or fixed in the cooking space.

Moreover, an evaluating and/or control unit, preferably in the form of a microprocessor may be provided in the cooking process sensor.

Finally, it is suggested that the cooking process sensor comprise a cable or a transmitter and receiver unit, including power supply.

In cooking, the method of the instant invention permits accurate determination particularly of the core temperature of food to be cooked, based on the kinematics, i. e. the course in time, of temperature values registered inside the cooking food by means of a cooking process sensor. This is possible even if cooking process sensors should not be positioned very accurately. Therefore, not only are better results obtainable but also results which are better reproducible since the cooking programs

are controlled by core temperatures. Furthermore, the duration of core temperature controlled cooking programs can be predetermined more precisely. The exact determination of a core temperature also makes it possible to provide a meaningful hygiene indication.

Other climatic parameters, such a moisture values, differential moisture values, and/or air flow values likewise can be picked up according to the invention so that it can be prevented that the surface of the cooking food dries out. On the contrary, the cooking food will result uniformly done, having the desired browning, color, consistency, and hygiene at the end of the cooking process. This means that standardized cooking quality can be warranted.

In particular, cost and energy can be saved in the course of a cooking process according to the invention by virtue of the values recorded by means of the cooking process sensor as the air flow required, the specific performance, and the like can be minimized.

Further features and advantages of the invention will become apparent from the following description of an embodiment according to the invention illustrated by way of example in the accompanying single diagrammatic figure which is a perspective view of an intelligent cooking process sensor according to the invention, shown introduced into food to be cooked.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective illustration of the inventive cooking food sensor according to the invention; and

Fig. 2 is a block diagram of the cooking utensil with a microprocessor evaluation and control unit connected to receive signals from the inventive cooking sensor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As may be seen Fig. 1, an intelligent cooking process sensor according to the invention in the form of a temperature sensor 10, for instance, comprises a tip 12, a handle 14, and a cable 16, the tip 12 being adapted to be inserted in cooking food 1. Moreover, there are four temperature sensors 20, 21, 22, 23 disposed in the area of the tip 12 and serving to detect the temperature in the cooking food, while there is another temperature sensor 24 inside the handle 14 to detect the temperature at the cooking food 1.

An evaluating unit 45 for the (differential) temperature values to be registered is integrated in the temperature sensor 10 according to the invention. This evaluating unit 45 in turn is connected to a microprocessor evaluation and control unit 29 or apparatus 29 for a cooking utensil 9.

The temperature sensor 10 according to the invention is useful for providing more than one value of temperature within the cooking food 1 and another value of temperature prevailing at the cooking food 1. Consequently, the thermokinetics of the (differential) temperature values obtained by means of the temperature sensors 20 to

24 may be relied upon for determining especially the actual core temperature of the cooking food 1, such as by extrapolation. The exact core temperature thus determined may then be utilized for controlling the cooking process.

In addition to the core temperature, the heat transfer into or to the cooking food 1 from a heater element 32 arranged in the cooking space also may be detected and used, for example, to control a fan ventilator 36. The course over time of the core temperature, determined on the basis of the (differential) temperature values detected, may be drawn upon in order to find out the load:power ratio during cooking, among others for determining the cross section of the cooking food.

Moisture sensors 25, 26, and 28 may also be provided in the sensor 10 at various locations including both in the food 1 or at the surface of the food 1.

Referring now more specifically to Fig. 2, the cable 16 connected to the cooking sensor 10 shown in Fig. 1 connects to the cooking utensil 9 having an internal microprocessor evaluation and control unit 29. An additional fixed sensor unit 30 may also be provided in the cooking space in addition to the sensor 10. This additional sensor unit is also connected to the microprocessor unit 29.

The cooking utensil microprocessor unit controls via respective control units 31, 33, 35, 37, 39, 41 and 43 a respective heater element 32, cooling element 34, ventilator unit or (fan) 36, moisture introduction unit 38, moisture discharge unit 40, energy supply unit 42, and energy distribution unit 44.

The features of the invention disclosed in the above specification, in the drawings and claims may be essential both individually and in any desired combination for implementing the invention in its various embodiments.

Although various minor modifications might be suggested by those skilled in the art, it should be understood that our wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come with the scope of our contribution to the art.

WE CLAIM AS OUR INVENTION:

1. The method for controlling a cooking process comprising the steps of:

controlling the cooking process in response to at least two temperature values picked up by a cooking process sensor stuck at least partly into food to be cooked; and

determining specific parameters of at least one of the cooking food and a cooking utensil for the cooking food via thermo-kinetics of the picked-up temperature values, and

utilizing the determined parameters for controlling the cooking process.

2. The method of claim 1 wherein a plurality of temperature values are detected by the cooking process sensor within the cooking food at different depths of penetration, and at least one other temperature value is detected outside of the cooking food, the values being utilized for control of the cooking process.

3. The method according to claim 2 wherein four of said temperature values are detected.

4. The method according to claim 2 wherein said at least one other temperature value is detected at a cooking food surface.

5. The method of claim 1 wherein at least one moisture value is registered by the cooking process sensor in the cooking food and drawn upon for controlling the cooking process.

6. The method according to claim 5 wherein the process sensor also measures at least one moisture value at the cooking food.

7. The method of claim 1 wherein air flow at least at the cooking food is registered by the cooking process sensor and used for controlling the cooking process.

8. The method of claim 1 wherein differential temperature values between sensors arranged spaced apart along a direction of penetration of the cooking process sensor are detected and used for controlling the cooking process.

9. The method according to claim 8 wherein at least two moisture value sensors are provided in the cooking process sensor and differential moisture values are obtained and utilized for controlling the cooking process.

10. The method of claim 1 wherein at least one of core temperature of the cooking food, placement of the cooking process sensor in the cooking food, diameter of the cooking food, density of the cooking food, type of cooking food, degree of

ripeness of the cooking food, pH of the cooking food, consistency of the cooking food, storage condition of the cooking food, smell of the cooking food, taste of the cooking food, quality of the cooking food, browning of the cooking food, crust forming of the cooking food, vitamin decomposition of the cooking food, formation of carcinogenic substances in the cooking food, hygiene of the cooking food, and heat conductivity of the cooking food is determined as a specific cooking food parameter picked-up by the cooking process sensor.

11. The method according to claim 10 wherein the parameter of placement of the cooking process sensor in the cooking food comprises placing the sensor at a core point of the cooking food.

12. The method according to claim 10 wherein the specific cooking food parameter is determined by extrapolation of values registered by the cooking process sensor.

13. The method according to claim 10 wherein the specific cooking food parameter is determined by iteration of values registered by the cooking process sensor.

14. The method of claim 1 wherein at least one of power, amount of air circulated, energy consumption, batch, specific performance, and load:power ratio of the cooking utensil is determined as a cooking utensil parameter picked up by the cooking process sensor.

15. The method according to claim 14 wherein the cooking utensil parameter is determined by extrapolation of values registered by the cooking process sensor.

16. The method according to claim 14 wherein the cooking utensil parameter is determined by iteration of values registered by the cooking process sensor.

17. The method of claim 1 wherein at least one of temperature values, differential temperature values, moisture values, differential moisture values, and air flow values picked up are supplied by the cooking process sensor to a control unit for at least one of the heater element, a cooling element, a ventilator, a unit for introducing moisture into the cooking space, a unit for discharging moisture from the cooking space, a unit for supplying energy, and a unit for dissipating energy.

18. The method according to claim 17 wherein the method controls the path of the cooking process.

19. The method according to claim 17 wherein the method achieves a set cooking result.

20. The method of claim 1 wherein at least one of temperature values, differential temperature values, moisture values, differential moisture values, and air flow values picked up by the cooking process sensor are utilized for controlling at least one of temperature path, moisture content, and air flow of at least one of the cooking food and cooking utensil.

21. The method of claim 1 wherein at least one of water activity, moisture content, and protein content of the cooking food is determined by the cooking process sensor.

22. The method according to claim 21 wherein the parameters determined are supplied to an evaluating unit.

23. A cooking process sensor, comprising:

a tip equipped with at least two sensors and shaped and designed for introduction at least partly into cooking food; and

a handle for insertion of the sensor into the cooking food.

24. The cooking process sensor according to claim 23 wherein at least four temperature sensors are provided at the tip and at least one temperature sensor is provided at the handle of the sensor.

25. The cooking process sensor of claim 23 wherein at least one other sensor unit is provided in fixed fashion in the cooking space.

26. The cooking process sensor according to claim 23 wherein a differential temperature value evaluating unit is provided in the handle of the sensor.

27. The cooking process sensor of claim 23 wherein the sensor is designed to provide sensor signals to an evaluating control unit in the form of a microprocessor.

28. The cooking process sensor according to claim 23 wherein the sensor includes a cable adapted for connecting to a cooking utensil.

29. A method for controlling a cooking process, comprising the steps of:

controlling the cooking process in response to at least two temperature values picked up by a cooking process sensor stuck at least partly into food to be cooked; and

determining specific parameters of the cooking food via thermo-kinetics of the picked-up temperature values, and

utilizing the determined parameters for controlling the cooking process.

30. A cooking process sensor, comprising:

an elongated tip equipped with at least two temperature sensors and shaped and designed for introduction at least partly into cooking food; and

a handle for insertion of the sensor into the cooking food.

ABSTRACT OF THE DISCLOSURE

In a method of controlling a cooking process, at least two temperature values are picked up by a cooking process sensor which is adapted to be stuck at least partly into food to be cooked. Specific parameters of cooking food and/or cooking utensils are determined via the thermo kinetics of the temperature values registered, and the specific cooking food and/or cooking utensil parameters determined are utilized for controlling the cooking process. The invention likewise relates to a cooking process sensor for use with the method according to the invention.

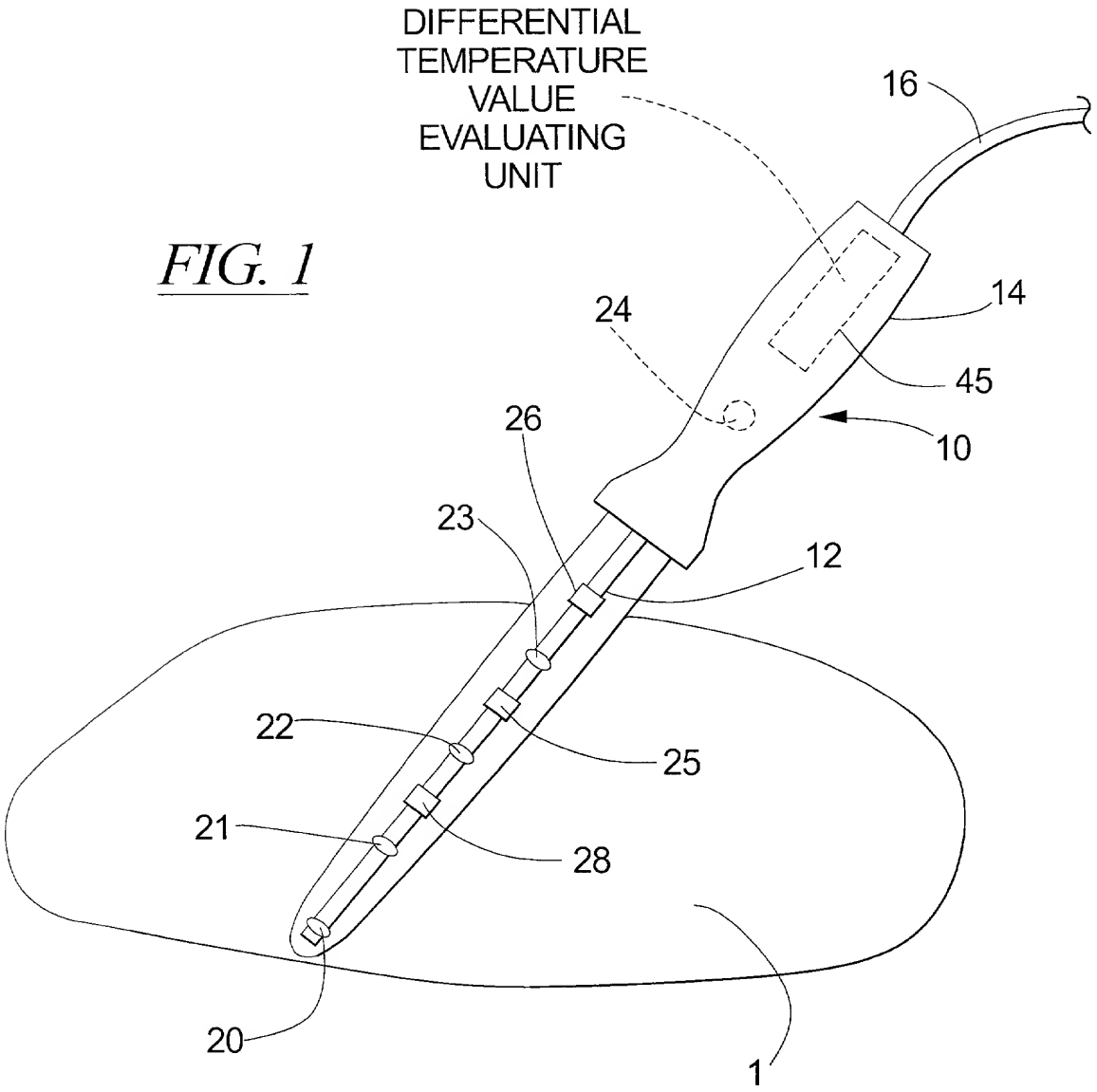
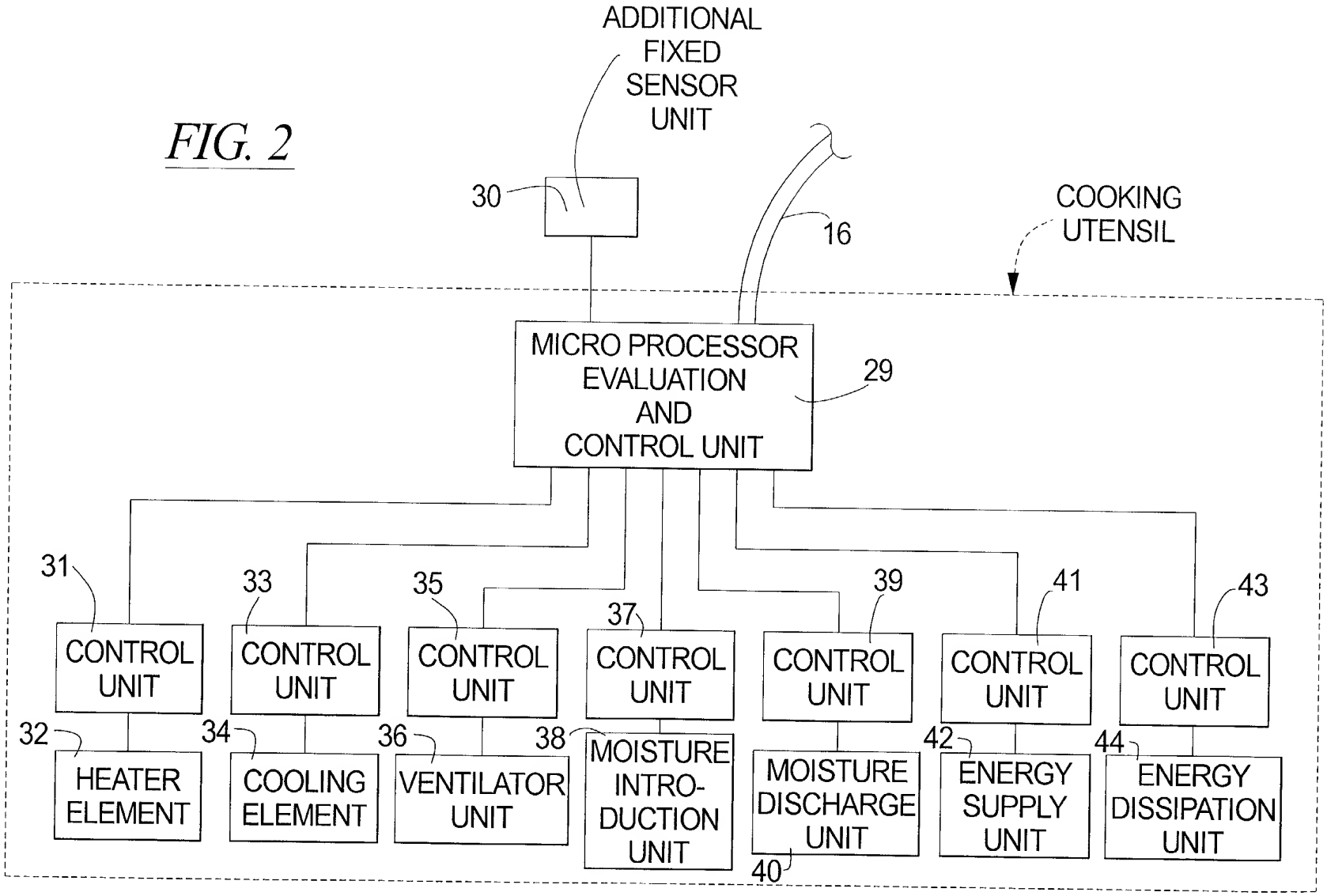


FIG. 1

FIG. 2



DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

"A METHOD OF CONTROLLING A COOKING PROCESS AND A COOKING PROCESS SENSOR FOR USE WITH THE METHOD"

Case No. **P-00,1757**, the specification of which

(check one)
- X is attached hereto.
- ___ was filed on _____, as Application Serial No._____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent Office all information which is known to me to be material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, 1.56(a).[1]

I do not know and do not believe this invention was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and I believe that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as identified below:

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below

Prior Foreign Application(s)

Number	Country	Date
199 45 021.8-34	**Fed. Rep. of Germany**	**September 20, 1999**

and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the above listed application on which priority is claimed:

Prior Foreign Application(s)

Number	Country	Date

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[1] (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a *prima facie* case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A *prima facie* case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

If no priority is claimed, I have identified all foreign patent applications filed prior to this application:
Prior Foreign Application(s)
Number Country Date

And I hereby appoint Messrs. John D. Simpson (Registration No. 19,842), Steven H. Noll (28,982), Brett A. Valiquet (27,841), James D. Hobart (24,149), Melvin A. Robinson (31,870) and Mark Bergner (45,877), all members of the Firm Schiff Hardin & Waite, my attorneys, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and direct that all correspondence be forwarded to:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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CERTIFICATE OF MAILING BY "EXPRESS MAIL"

"Express Mail" Mailing Label Number EJ220501797US

Date of Deposit: September 18, 2000

I hereby certify that the following is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

U. S. Patent Application comprising pages 1-16 - with 30 claims for Michael Greiner et al - entitled "A METHOD FOR CONTROLLING A COOKING PROCESS AND A COOKING PROCESS SENSOR FOR USE WITH THE METHOD" - Case No. P00,1757 - unexecuted Declaration - two sheets of formal drawings, and filing fee

Signature of Person Mailing
Application and Fee